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SUDDEN DEATH FROM ATHEROSCLEROSIS OF THE CORONARY ARTERIES,  
AND A. L. MYASNIKOV'S CLASSIFICATION OF ATHEROSCLEROSIS

-USSR-

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## FOREWORD

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SUDDEN DEATH FROM ATHEROSCLEROSIS OF THE CORONARY ARTERIES,  
AND A. L. MYASNIKOV'S CLASSIFICATION OF ATHERO-  
SCLEROSIS

-USSR-

[Following is the translation of an article by  
N. M. Dement'yev (Leningrad) in Klinicheskaya  
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137-139]

At the conference of the Institute of Experimental Medicine of the Academy of Medical Sciences of the USSR on 15-17 March 1956, A. L. Myasnikov proposed a classification of atherosclerosis. This classification was published in the book Ateroskleroz i koronarnaya nedostatochnost' (Atherosclerosis and coronary failure). In the debate on the subject of "Atherosclerosis" at the 16th All-Union Congress of Therapeutists on 7-14 October 1956, this classification on the whole met with approval. However, P. Parshin and particularly I. V. Davydovskiy pointed out that there was a substantial gap in Myasnikov's classification with respect to coronary atherosclerosis. The author of the classification says nothing about the so-called concealed or "mute" or "deaf" forms, in which atherosclerosis of the coronary arteries develops without symptoms. Davydovskiy pointed out that "non-clinical" mute coronary atherosclerosis not only exists, but is rather the rule, whereas clinical atherosclerosis is rather the exception. Neither Parshin nor Davydovskiy gave any statistics regarding the frequency of the concealed forms of atherosclerosis. Nor are there any such statistics in the literature known to us.

As regards atherosclerosis of the coronary arteries which takes a latent course, it very often terminates in sudden death. A practically healthy person, who has not considered himself sick and has, therefore, not resorted to medical aid, dies suddenly and unexpectedly for his associates.

In the autopsy of the body of such a patient very sharp atherosclerotic changes are often discovered in the coronary arteries of the heart, frequently with extensive cicatricial changes in the myocardium.

Autopsies of the bodies of persons who have died suddenly are made by a coroner as a matter of forensic medicine. Hence, pathologic anatomists and hospital prosecutors are not very familiar with the morphological picture in such latent forms of coronary atherosclerosis. Still less known are these cases to clinicians -- they fall outside their field of vision.

The term "sudden" death itself defines its most characteristic trait: only a very little time elapses from the moment when a person feels ill until his death. Such a patient not only does not get to a stationary dispensary, but even the first-aid physician often does not reach him until he is dead. Hence, latent atherosclerosis is not very familiar to clinicians and pathologic anatomists, whereas forensic-medicine experts encounter it daily. However, even in the forensic-medicine literature there are no statistics on the "mute" forms of coronary atherosclerosis. It is not surprising, therefore, that latent atherosclerosis did not find its reflection in Myasnikov's classification.

The present article sets itself the task of acquainting cardiologists, chiefly clinicians, with the "mute" forms of coronary atherosclerosis terminating in sudden death.

Sudden death, according to the data possessed by our faculty (see collection Serdechnososudistaya patologiya /Cardiovascular pathology/, Leningrad, 1958) constitutes 44.4% of the total forensic autopsies on adults; 70.7% of them involved sudden death from atherosclerosis of the coronary arteries. According to A. I. Kedrov (1926), sudden death from diseases of the cardiovascular system is observed in 79% of the cases; according to T. A. Kochetkova (1950), in 94.1%.

Let us dwell upon atherosclerosis of the coronary arteries terminating in sudden death, from the viewpoint of the clinical data which could be obtained with sufficient reliability from the relatives of the deceased or from medical documents. We must specify that the information that we obtain from relatives and close friends should be accepted somewhat critically. We have used only such information as was sufficiently reliable. It should be stated that even the anamnestic data obtained from the patients themselves in the clinic also vary in degree of reliability, as everyone well knows. We collected 110 cases of sudden death from coronary atherosclerosis in which the information about the deceased given by their relatives and close friends was sufficiently full and, in our opinion, reliable.

Atherosclerosis of the coronary arteries of the heart in those who have died suddenly from this disease may be divided into two classes by clinical symptoms. The first group is concealed or "mute" atherosclerosis; the second group is atherosclerosis with pronounced clinical manifestations of disease of the coronary arteries (N. M. Dement'yeva, 1958).

The group of latent atherosclerosis of the coronary arteries of the heart in patients who have died suddenly is characterized by the fact that they had no complaints about the condition of their heart during their lifetime. They were practically healthy persons who, in fact, had no occasion to consult a physician, inasmuch as they considered themselves to be in good health. This is precisely the group of patients that escape the observation of the clinical physician. According to our data, they form 42% (46 out of 110 patients).

The clinical group of atherosclerosis in cases of sudden death formed 58% (64 out of 110) and was characterized by the fact that the patients of this group uttered complaints which, except for atypical forms, point to disease of the cardiovascular system.

Myasnikov's classification from the viewpoint of clinical symptoms provides for only one group: the clinical. But the clinical group includes two periods of development of atherosclerosis of the coronary arteries. The first period is characterized by the concealed course of the atherosclerosis and is called pre-clinical. To the second period belongs atherosclerosis with clinical manifestations. However, one cannot equate our first group (concealed "mute" form) with the first period of atherosclerosis in Myasnikov's classification. Our first group comprises those concealed forms which differ precisely by the fact that they develop without symptoms from the beginning of the disease until sudden death. The concealed period in Myasnikov's classification characterizes a certain definite stage of the disease, sometimes protracted, sometimes brief, in which atherosclerosis does not manifest itself by subjective feelings. Then this period is succeeded by the clinical period, in which definite subjective and objective symptoms do appear. Both periods of atherosclerosis of the coronary arteries in Myasnikov's classification express a clinical form of the disease, and only the initial stage of the atherosclerosis process is concealed.

As regards clinico-anatomic comparisons, the concealed period, according to Myasnikov, is characterized by a change

by a change in the condition of the lipoids and lipoproteins, but pathologo-anatomical expressions of atherosclerosis are absent in this period.

The second period of atherosclerosis -- the clinical -- includes three stages. The first stage -- the ischemic -- is characterized by the development of dystrophic processes in the myocardium and signs of strain induced angina pectoris, and also by signs of heart failure of degree I. An expression of the second stage -- thrombonecrotic -- are graver changes in the myocardium: small-focus necroses, acute and lingering infarcts. Finally, the third stage - sclerotic -- is characterized by the development of atherosclerotic cardiosclerosis, which may cause heart failure of any degree, disturbances of the rythm and conductivity, etc. Here, Myasnikov states, a clear division of the process into the above-mentioned stages is not always possible, since changes characteristic of the third, fibrose stage may be simultaneously encountered in some sections of the heart, while in other sections there develop at the very same time changes belonging, according to the proposed classification, to the second, thrombo-necrotic stage.

The concealed form of atherosclerosis excludes the division of atherosclerosis into a first and a second period, according to Myasnikov's classification, and thereby also excludes a division into stages of the development of the clinico-anatomical changes observed in the clinical form of atherosclerosis. In the concealed form one frequently encounters very severe sclerotic affections of the heart, as well as complications of it: obstruction of the coronary arteries in one stretch of them or another, thrombosis of the coronary arteries, cardiosclerosis, aneurysms of the heart and necroses of the heart muscle. This form of atherosclerosis may be accompanied also by changes in the internal organs (stagnant liver, stagnant lungs, etc.), indicating chronic heart failure.

Thus, a sharp disagreement between the clinical and the pathologo-anatomical data is especially characteristic of the concealed form of atherosclerosis.

As an illustration of the concealed course of atherosclerosis of the coronary arteries of the heart and its severe complications we cite one of many examples.

Male patient M., age 34. Apart from periodic aggravations of inflammation of the sciatic nerve, he noted no ailments. He experienced no unpleasant feelings or pains in the region of the heart and was never short of breath.

At two o'clock in the night before the day of his death he went out in a bus with his factory associates to gather mushrooms in the woods. He felt well. In the woods he carried brushwood and kindled campfires. He was gathering mushrooms until 12 o'clock noon. At 12 o'clock a sharp pain suddenly appeared in his chest. With the aid of his wife, he walked about 500 meters to a bus, in which he died. The pains in his chest began about 1-1½ hours before his death.

Autopsy established isolated stenosing atherosclerosis of the proximal section of the descending branch of the left coronary artery with a fresh thrombus, located on an atherosclerotic patch at the mouth of this artery. The weight of the heart was 360 g., the thickness of the wall of the left ventricle 1-1.3 cm., that of the right ventricle 0.2-0.3 cm.; that of the interventricular septum 2.5 cm. In the wall of the left ventricle and the interventricular septum, in the region of the apex of the heart, there were numerous micro-foci of necrosis of muscular tissue of unknown age -- from fresh ones to those in various stages of organization with phagocytising cellular elements present in some of them; numerous foci of fat dystrophy on the border between the middle and lower sections of the heart; and ischemia of the myocardium.

As may be seen from this example, atherosclerosis of the descending branch of the left coronary artery was taking a latent course, in spite of the fact that the patient was performing heavy physical labor and thereby placing increased demands upon his heart.

Not only the atherosclerosis of the descending branch of the left coronary artery, but also the grave changes connected with it in the myocardium of the left ventricle and the septum of the heart were developing latently: numerous micro-foci of necrosis of the heart muscle and adipose dystrophy of individual muscular groups. The different ages of the foci of necrosis in the myocardium attest that they did not arise simultaneously, but developed over a protracted interval, long before the formation of the thrombus.

Thus, from the viewpoint of the evaluation of the clinical data, this example illustrates the concealed course of atherosclerosis from beginning to end, and from the standpoint of the evaluation of the morphological data all the pathologo-anatomic changes in the arteries and the heart muscle characterize a combination of all three stages of the second period in the development of athero-

sclerosis -- the clinical in Myasnikov's classification. Adipose dystrophy of the myocardium characterizes stage I of the second period of the atherosclerosis -- the ischemic; numerous foci of micronecroses, stage II -- the thrombotic; growth of the connecting tissue in the necrosis foci and their organization constitute stage III -- the sclerotic. Consequently, on the one hand we have the concealed course of atherosclerosis and, on the other hand, all stages of development of pathologo-anatomic changes characterizing the clinical form of atherosclerosis. Hence the concealed form does not fit into the frame of the classification proposed by Myasnikov either according to the clinical, or even according to the morphological symptoms and therefore needs to be included in that classification as an independent group.

Unlike the concealed form of atherosclerosis of the coronary arteries, the group of clinical atherosclerosis of these arteries in persons who have died suddenly from this disease does fit into Myasnikov's classification, but with certain reservations. The clinical group of atherosclerosis in cases of sudden death is observed in 58% of the total forensic autopsies of persons who have died of this disease.

An analysis of the medical documents and information given by the relatives of persons who have died suddenly shows that in the development of the atherosclerosis of this group (clinical) it is also possible to observe all three stages of the development indicated by Myasnikov, only they are often not combined in that sequence in which they are mentioned in the classification. Moreover, not only symptoms are observed. Thus, for example, in the first stage -- ischemic -- angina pectoris is noted not only under strain, but also at rest; along with this, all three degrees of heart failure are sometimes observed. At the same time, in the third stage -- fibrose -- one may note only attacks of angina pectoris, and there are often no indications of pronounced heart failure or morphological expressions of it. The disagreement between the clinical and the pathologo-anatomical data is often less vividly expressed in the clinical form than in the concealed form of coronary atherosclerosis.

Summarizing the foregoing, we come to the conclusion that the classification of atherosclerosis should include both forms of its development: the concealed form and the clinical form. It is quite evident that for a full conception of coronary atherosclerosis and a complete reflection of all its forms it is advisable to include



not one, but two forms of this disease in a classification of it. Thus, the first group should include the clinical forms with division into periods and stages of development, as reflected in Myasnikov's classification. The second group should include the concealed forms of development, about which nothing is said in Myasnikov's classification.

It must be added to the foregoing that a true idea of the mortality from atherosclerosis and its complications can be gained only by summing up the data from pathologo-anatomical hospital autopsies and from the autopsies made by court coroners on persons who have died suddenly of atherosclerosis.

The discovery of concealed forms of atherosclerosis of the coronary arteries is of great practical significance in questions of the prophylaxis and treatment of coronary atherosclerosis patients, particularly in the prophylaxis of sudden death.

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